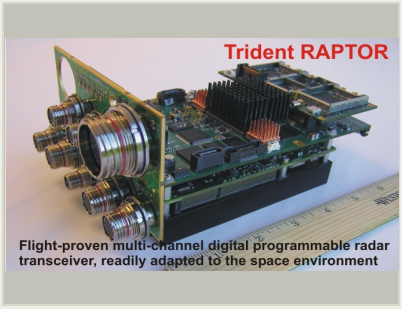
Space-Qualifiable Digital Radar Transceiver, Phase II

Completed Technology Project (2014 - 2016)

Project Introduction

Historically, radar systems have tended to be either large, complex, power-hungry, purpose-built systems, or extremely simple systems of limited capability. More recently, miniaturization of high-performance programmable integrated circuit technologies as embodied in field-programmable gate arrays (FPGAs), as well as rapid advances in high-speed data conversion technologies at a gigasample per second and beyond, have enabled the implementation of direct-conversion radio frequency (RF) systems, including radar, that operate almost completely in the digital domain. In addition, solid-state high-power RF device technologies have improved in efficiency and speed to the point where highly efficient pulsed transmit sources are possible. As these device technologies have matured, their application in space environments has accelerated to the point where extremely flexible programmable radar systems can be implemented in a very small size, weight, and power footprint. Trident Systems has developed a powerful radar architecture called RAPTOR, validating it through flight testing on a number of Department of Defense programs. In Phase I of this effort, Trident Systems developed and validated a design concept for a flexible, programmable space-qualifiable digital radar transceiver (SQDRT) based on RAPTOR. This was accomplished through a comprehensive development process consisting of mission and requirements analysis, component trade studies, design analysis and simulation, and interface & form factor trade studies. The objective of the Phase II effort is to successfully produce a functioning form-factor prototype of the SQDRT, through a comprehensive program of system modeling and simulation, detailed digital & RF electronic design, FPGA firmware development, mechanical design, fabrication, integration, and testing, culminating in a prototype demonstration. By basing the solution on proven RAPTOR technology, the system will rapidly achieve a high TRL.



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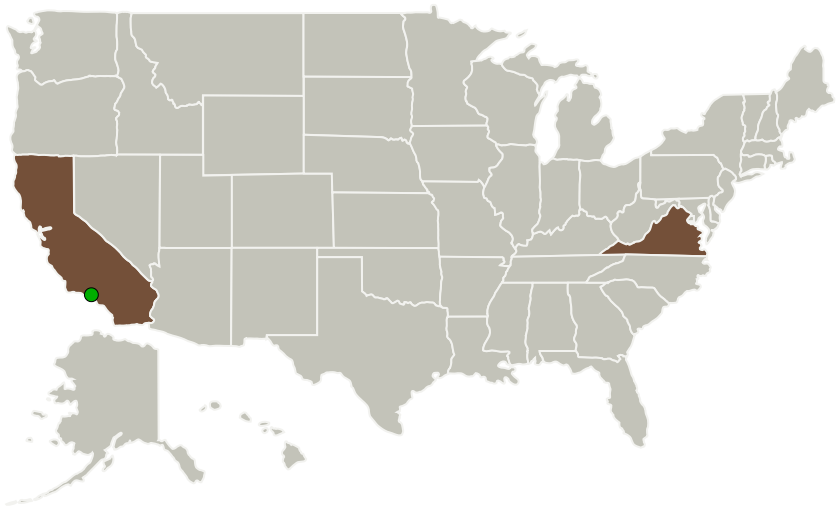
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Trident Systems, Inc.	Lead Organization	Industry	Fairfax, Virginia
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Virginia

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Trident Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

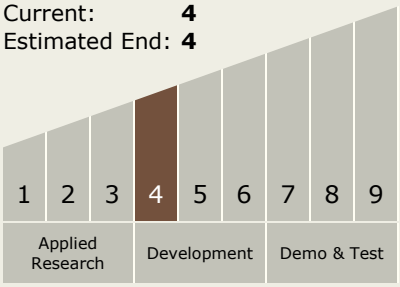
Carlos Torrez

Principal Investigator:

Michael Viazanko

Technology Maturity (TRL)

Start: **4**
Current: **4**
Estimated End: **4**



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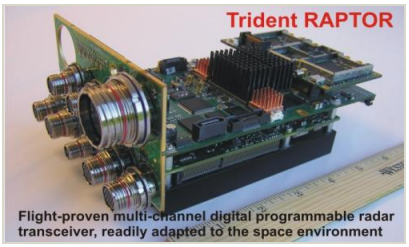
Images



Briefing Chart Image
Space-Qualifiable Digital Radar Transceiver, Phase II
(https://techport.nasa.gov/image/135330)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System